

## **Bioacoustics/Optics Integration with two Platforms: Biomaper-II Used in Surveying a Coastal Region and a Fixed Near-Shore Setup**

Timothy K. Stanton

Department of Applied Ocean Physics and Engineering

Woods Hole Oceanographic Institution

Woods Hole, MA 02543

E-mail: [tstanton@whoi.edu](mailto:tstanton@whoi.edu)

Phone: (508) 289-2757; Fax: (508) 457-2194

Peter H. Wiebe

Department of Biology

Woods Hole Oceanographic Institution

Woods Hole, MA 02543

E-mail: [pwiebe@whoi.edu](mailto:pwiebe@whoi.edu)

Phone: (508) 289-2313

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### **LONG TERM GOAL**

This is associated with the parent grant ONR N00014-95-1-0287 entitled "Acoustic scattering models of zooplankton and microstructure" that has a long term goal of understanding the acoustic reverberation properties of zooplankton and microstructure so that there will be an improved capability in 1) predicting sonar performance and 2) use of sonars in the mapping of the zooplankton and microstructure. See report of that grant for more details.

### **APPROACH**

The key aspect to the approach in this AASERT research is the integration of acoustics backscatter data and video plankton recorder data in order to identify and quantify the sources of scattering in the water column in the ocean. This is being done in two ways: 1) Development and use of a simple set of hardware that contains several acoustic transducers and a video plankton recorder. This system can be deployed on the seafloor (cabled to shore) or cast from a ship (cabled to the ship). Acoustic scattering data and video data from the \*same\* volume of water is collected simultaneously so that there can be one-for-one correlation between what is seen acoustically in the water and what is being seen optically in the water. 2) To combine acoustics and video plankton recorder data sets from the newly developed BIOMAPER-II survey system so that correlations can be made between the acoustics and optics from broad-scale surveys of shallow water regions.

### **WORK COMPLETED**

1. Conducted in situ measurements of target strengths of free-swimming zooplankton with integrated acoustics/optics system mounted onto a remotely operated vehicle.
2. Processed data collected in BIOMAPER-II survey of Gulf of Maine.

## **RESULTS**

1. Analysis of target strengths of gas-bearing zooplankton (siphonophores) showed high levels while they are in their natural environment. These in situ measurements are consistent with the high levels measured in the laboratory and confirmed the hypothesis that the animals produced high echoes in the ocean. 2. Analysis of scattering by the internal wave in the Gulf of Maine showed that the frequency dependence of the scattering varied between layers inferring different mechanisms (zooplankton versus turbulence) for the scattering.

## **PATENTS**

None